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Top Secret

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Imagery Analysis Report

Chang-tien Alumina and Aluminum Plants

China

25X1

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Top Secret

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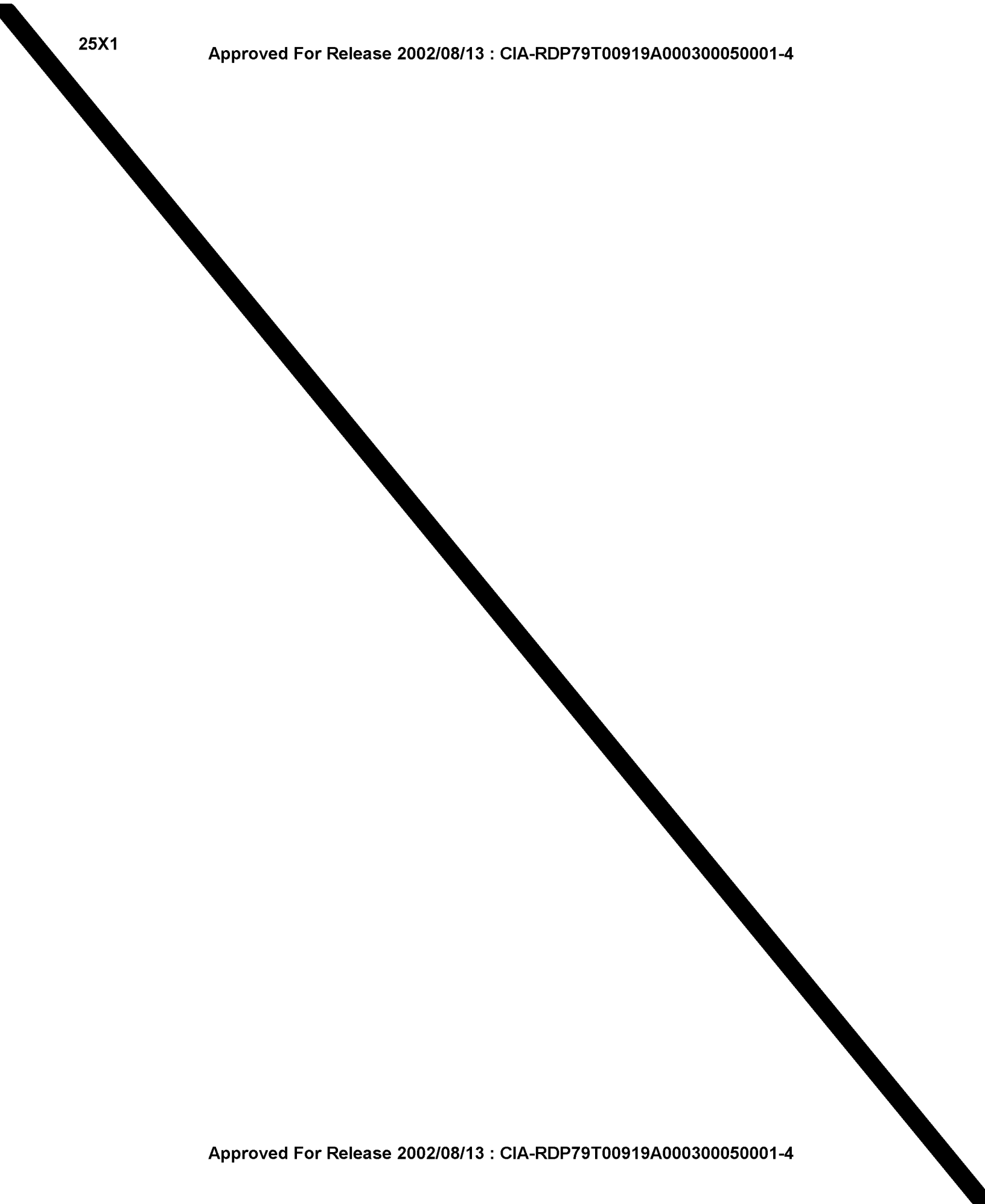

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IMAGERY ANALYSIS SERVICE

[redacted] 25X1

October 1967

CHANG-TIEN ALUMINA AND ALUMINUM PLANTS

CHINA

SUMMARY

This is the first detailed study of the Chang-tien Alumina Plant, the major Chinese producer of alumina, and the Chang-tien Aluminum Plant, one of four Chinese aluminum producing plants. An analysis of these plants reveals the use of a type of lime-soda-sinter process to produce alumina and the use of two [redacted] electrolytic cell buildings to produce aluminum. Both plants were complete when first seen [redacted] and they have not changed since. However, a high level of activity was noted [redacted]

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25X1

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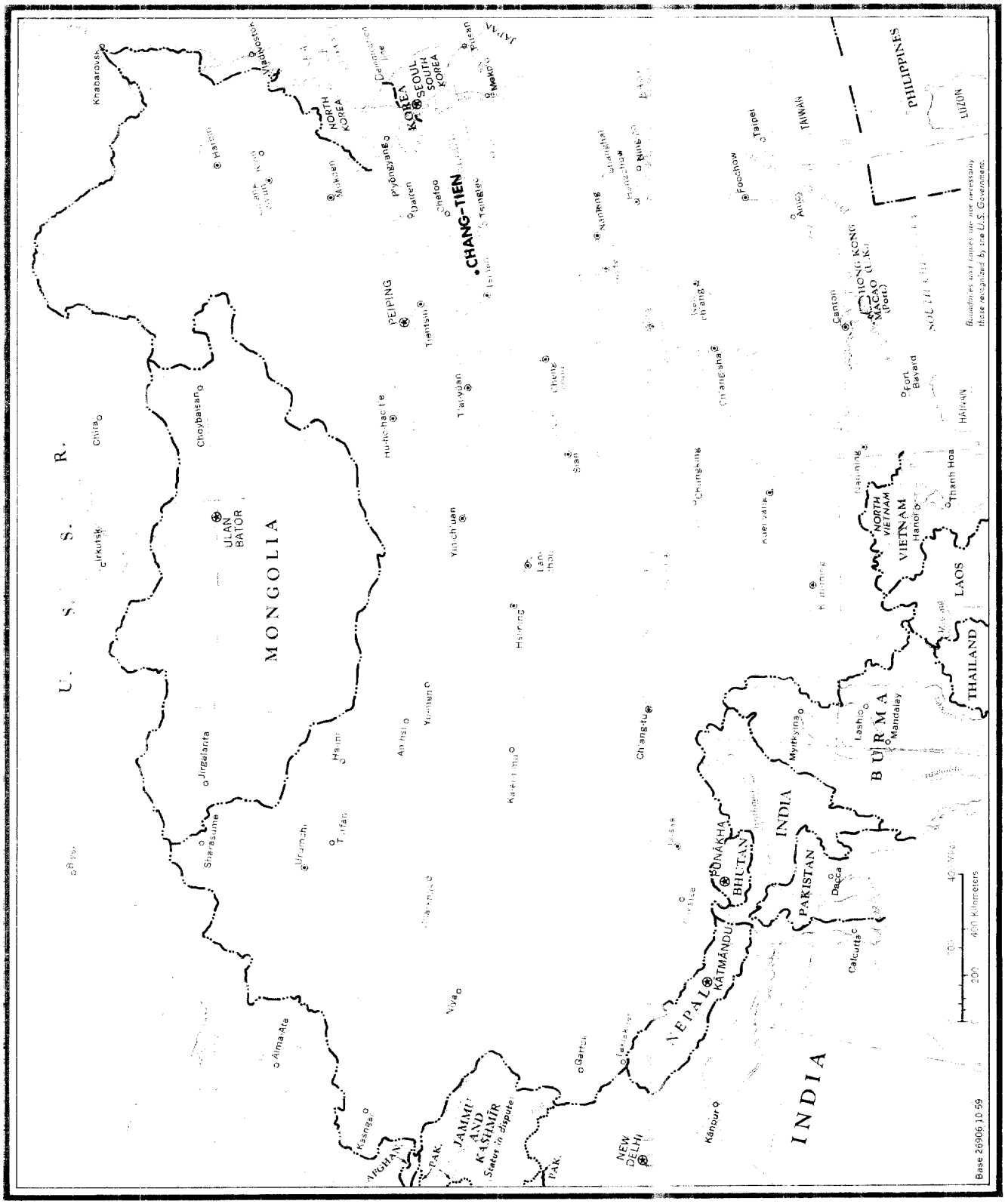

FIGURE 1. LOCATION MAP

INTRODUCTION

These plants are located 27 nautical miles south of Chang-tien, China at 36-45N 118-03E (Figure 1). Both plants are connected to the Chang-tien rail and road networks.

The purpose of this report is to identify the facilities at the alumina and aluminum plants, to note any new construction activity, to report the level of plant activity, and to determine the size of the electrolytic cell building for aluminum production. An annotated photographic enlargement of the plants from the latest mission [redacted] used in this report is included. The specific function of the buildings annotated on that enlargement is found on the accompanying key to annotations. The areas referred to in this report are found on Figure 2. 25X1

All measurements have been made by the NPIC Technical Intelligence Division and are considered to be accurate [redacted] whichever is greater. 25X1

DISCUSSION

These plants were first seen on [redacted] imagery. Since that time they have undergone little or no change. A high level of activity was observed at both plants on [redacted] 25X1 25X1

25X1 [redacted]

The alumina plant is secured by a wall and nearly surrounded by a moat. The aluminum plant is secured by a wall.

Alumina Plant

The alumina plant (Area A) covers approximately 38 acres and its adjacent red mud lake an additional 45 acres. The layout and flow of materials at this plant are not typical of the more common combination-dry process for producing alumina. Analysis of the flow and identification of various components indicates that the Peniakoff (sodium sulfate) process is probably utilized.

In the Peniakoff process a mixture of powdered bauxite, sodium sulfate, and coal are charged into rotary kilns (item 19) to form a sinter. Sulfur dioxide and carbon dioxide gases from these kilns are collected and subsequently utilized. The sinter from the kilns is sent to the crushing and leaching building (item 18) where it is mixed and leached with a dilute caustic soda solution to form sodium aluminate. After leaching is complete the mixture is filtered to remove red mud waste. The impure aluminate solution is refiltered (item 22) and then sent to autoclaves and filtered a third time to remove silicate mud (probably in item 23).

The purified sodium aluminate is piped to precipitation columns (item 14) where it is decomposed, using carbon dioxide obtained from the kilns mentioned earlier. The precipitate of aluminum hydroxide from these columns is filtered, washed with acid, and finally thickened (item 13) before it passes to rotary kilns (item 8) where it is calcined to form alumina (aluminum oxide). The alumina is conveyed to the alumina silo (item 4) and/or storage building (item 3) from where it can be transferred to the nearby aluminum plant or shipped to other plants.

The Peniakoff process of producing alumina is primarily used for the reduction of a high silica bauxite ore. Collateral reports that this alumina plant makes use of a local, high silica, diaspore, bauxite ore. 1/ These two factors along with the fact that the three other widely known lime-soda sinter processes are easily recognizable indicate that the Peniakoff process is probably used in this plant.

Aluminum Plant

The aluminum plant (Area B) consists of two electrolytic cell buildings (potrooms), a rectifier building, a casting building, and a transformer yard. The potrooms are typical of those at Chinese plants constructed [redacted] 25X1 25X1 [redacted] A carbon paste plant (Area A, item 1) which supplies anodes to this plant is located within the bounds of the alumina plant. A road provides direct access from the carbon paste plant to the aluminum plant.

Administration and Fabrication Area

This area (Area C) is located on the west side of the alumina plant. It contains two irregularly shaped administration buildings, five fabrication buildings, three workshops, ten storage buildings, transformer substation, and numerous support buildings. There has been no changes to the area since [redacted] 25X1 25X1 and it appeared highly active on [redacted] 25X1 [redacted]

Thermal Electric Power Plant

The electric power used in the alumina and aluminum plants is supplied by the Chang-tien (Nan-ting) Thermal Power Plant (Area D) located north of the aluminum plant. This large thermal power plant is described in detail in
25X1 CIA/PIR 65144, [redacted] dated June 1966. 2/

Cement Plant

The cement plant (Area F), located east of the alumina plant, utilizes the red mud waste from the alumina plant to produce cement. This plant currently has two rotary kilns in operation and two additional rotary kilns under construction. A pipeline leads from the waste lake (Area E) into this plant. The use of waste from high silica aluminate ores produces a high-quality cement.

TABLE I. CHANG-TIEN ALUMINA AND ALUMINUM PLANTS

Key To Annotations

Area A: Alumina Plant

1. Carbon Paste Plant
2. POL Storage Tanks
3. Storage Buildings
4. Alumina Silos
5. Coal and Ore Storage Yard
6. Cooling Ponds
7. Producer Gas Retorts
8. Calcining Kilns
9. Soda Storage and Causterizing
10. Unidentified Facilities
11. Ore Storage Building
12. Probable Autoclave
13. Probable Thickening Tanks
14. Precipitation Columns
15. Evaporators
16. Coal Storage Yard
17. Limestone Storage Yard
18. Crushing and Leaching of Sinter
19. Sintering Kilns
20. Unidentified Facility
21. Thickening Tanks
22. Filter Building
23. Unidentified Buildings

Area B: Aluminum Plant

1. Electrolytic Cell Buildings
2. Transformer Yard
3. Rectifier Building
4. Casting Building

Area C: Administration and Fabrication

1. Transformer Substation
2. Ten Storage Buildings
3. Fabrication Building
4. Administration Building
5. Workshop
6. Four Fabrication Buildings

Area D: Thermal Power Plant

1. Cooling Towers
2. Switching Yard
3. Boiler House
4. Generator Hall
5. Coal Yard
6. Spray Ponds

Area E: Waste Area

1. Four Mud Lakes
2. Pipeline Serving Cement Plant

Area F: Cement Plant

1. Cement Silos
2. Clinker Building
3. Two Rotary Kilns
4. Two Rotary Kilns (U/C)

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[redacted] 25X1

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REFERENCES

[redacted]

Documents

1/ CIA. [redacted] Shantung Alumina Plant, 25 January 1960 (Unclassified) 25X1

2/ CIA. PIR-85144, [redacted] Chinese Power Plants, Shantung Province, June 1966 (TOP SECRET [redacted]) 25X1 25X1

Requirement

C-RR7-84,276

IAS Project

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[redacted]